

Function.

This board converts serial binary data to a frequency modulated signal and also performs the reverse function. The output tones can either be applied to a tape recorder input for data storage, or to a loudspeaker for telephone transmission (is this legal?). A relay is provided for control of the tape transport.

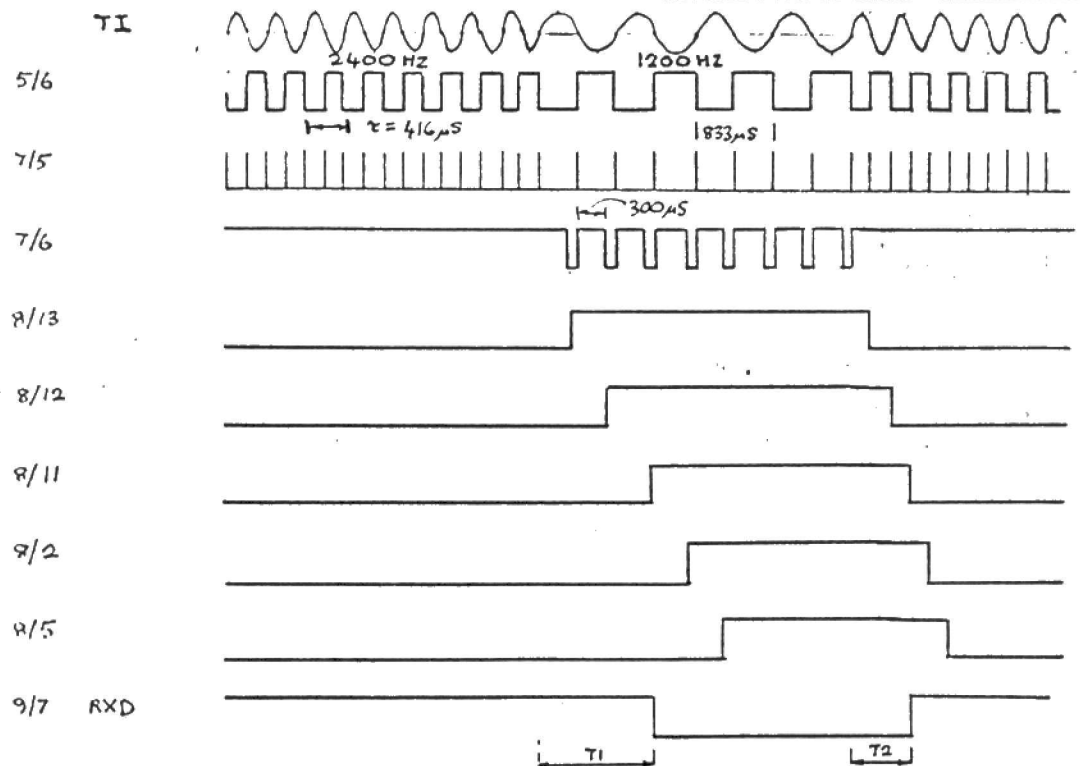
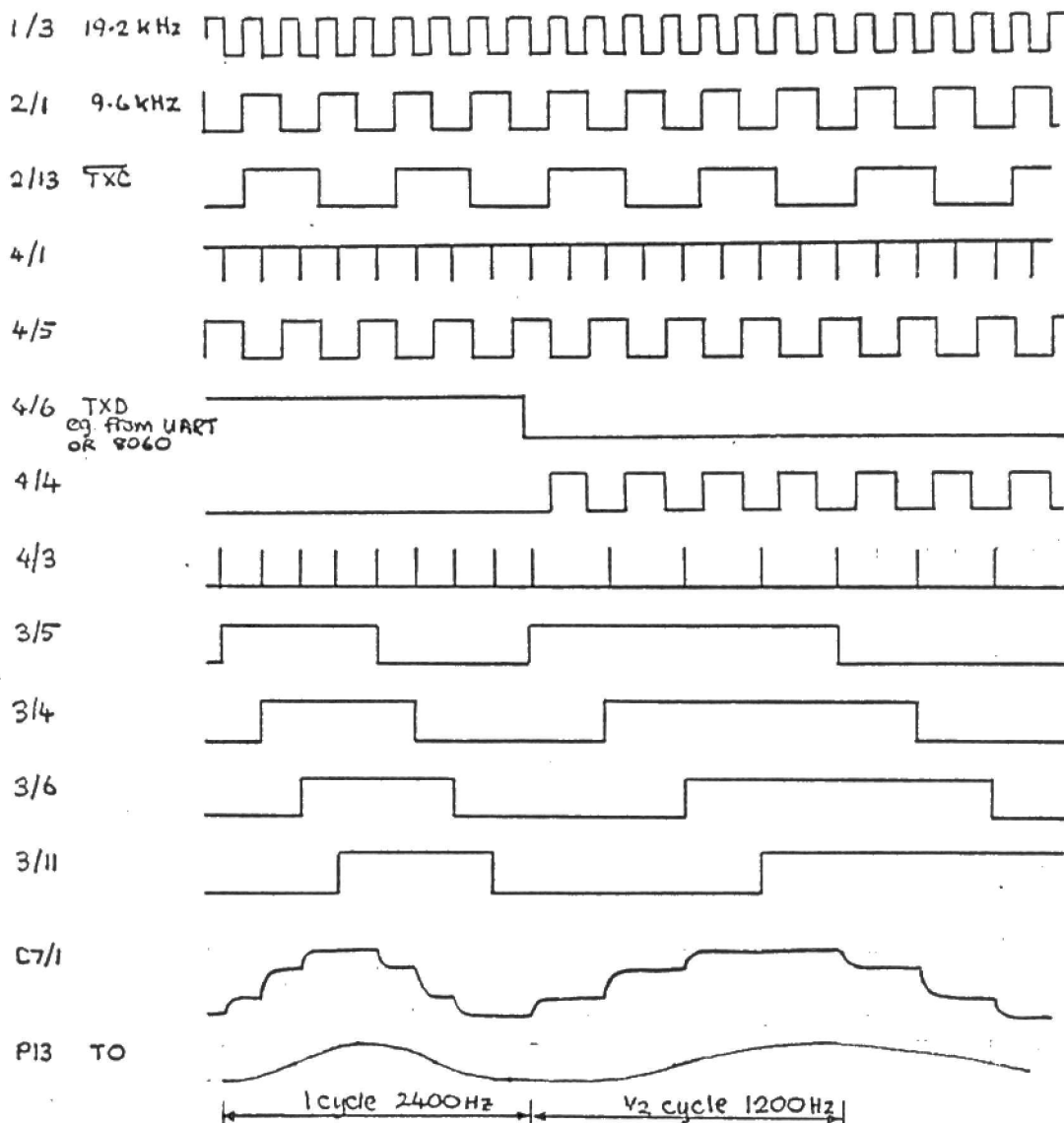
Operation.

IC1 forms the master oscillator, which should be adjusted to 19.2 kHz using VR1 and test point P9. With this master frequency the two tones output are 1,200 and 2,400 Hz. The master frequency is divided by 2 & 4 using IC2. The output from IC2.b (TXC) is 4.8kHz and suitable for clocking a UART operating at 300 baud. Gates from IC4 then select either 19.2 or 9.6 kHz according to the data to be transmitted (TXD), and feed this to the clock input of the ring counter IC3. This counter is used to synthesise a sine wave in conjunction with the low pass filter which follows it. The resultant tone output (T_O) is then close to a sine wave with about 1V p-p amplitude. A sine wave can be more accurately recorded than a square wave, and this improves the accuracy of the tape system. A booster stage allows a miniature loudspeaker to be driven by the tones (LS).

The receiver section uses IC5 to amplify the received tone. Some positive feedback has been added round this stage to give hysteresis which reduces the sensitivity to noise. The gain of the stage can be altered with VR2. However, for maximum sensitivity R26 (100k) can be omitted, although this then also removes the hysteresis. The output from IC5 should be a limiting square wave. IC6 is an edge detector and produces a narrow positive pulse on both edges of the input square wave. IC7 is a retriggerable monostable which should be adjusted to give a pulse width of 300 μ S. When 2.4kHz is being received then the monostable receives pulses at 2.4kHz or every 210 μ S and so never times-out, whereas for the 1.2kHz tone a pulse is received every 420 μ S so that the monostable does reset between pulses. Now the monostable is arranged to be negative edge triggered by connecting pin 4 to ground, whereas data is loaded into the shift register (IC8) on the positive edge of the edge detector pulse. In this way the shift register samples the monostable output data just prior to it being retriggered. The parallel outputs of the register are fed to a majority input gate (IC9). This device takes a consensus view of the data being received, and is important in reducing the effects of minor tape defects in producing erroneous data.

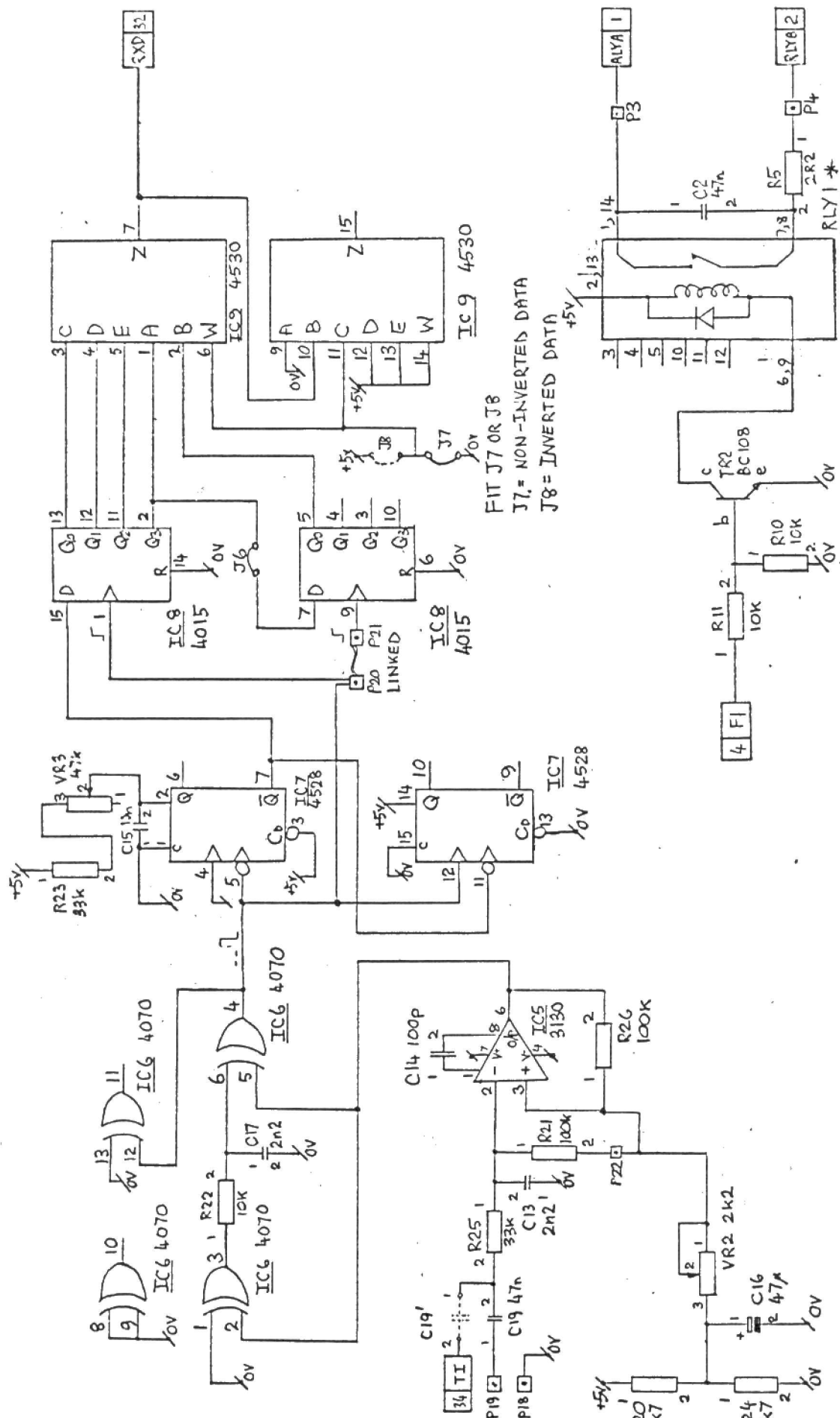
If an oscilloscope is not available for adjusting the monostable timing, the adjustment can be made by applying a frequency of 1.68kHz to T1 and adjusting VR3 so that the output (RXD) is on the point of changing from a '0' to a '1'.

X/Y INDICATES IC X PIN Y

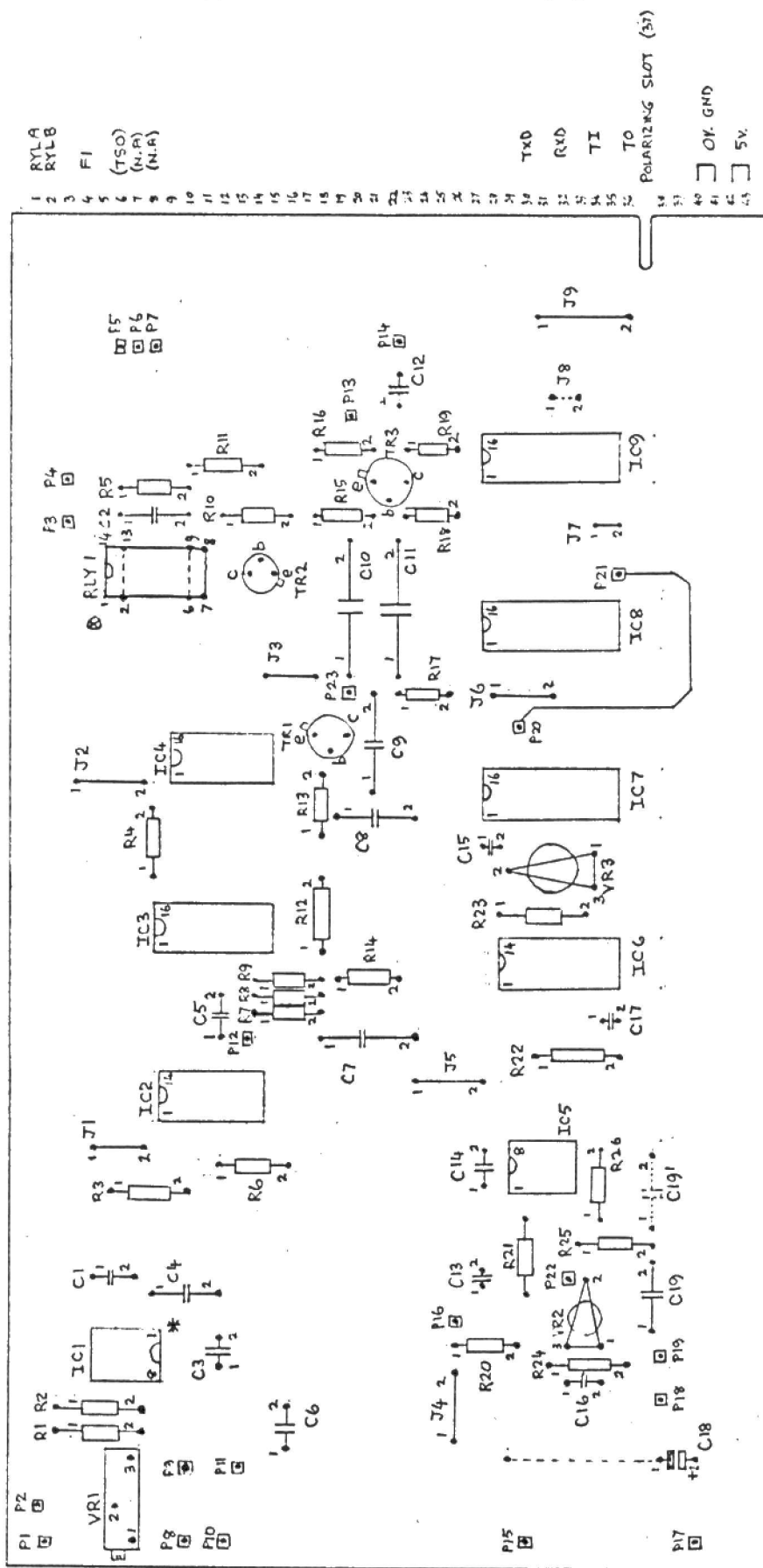


GREENBANK ELECTRONICS
TITLE TP.A.2 (TIMING DIAGS)
DWG NO 101671 1 OF 1

ENG DATE 8-3-80
DWN K.S.P. DATE
CHK DATE



NOTE: P INDICATES 'PAD' OR HOLE NUMBER		NOTE: SUPPLIES TO CORNER PINS OF IC'S EXCEPT WHERE SHOWN		NOTE: *RLY1, IF STANDARD TYPE IS FITTED LINK PINS (6+9) AND (2+13) BY MEANS OF WIRE LINKS ON THE TRACKSIDE OF THE BOARD		ENG. JSD DATE 11-79		GREENBANK ELECTRONICS	
TITLE		DATE		DATE		DATE		DATE	
TP.A-2 (CIRCUIT)		TP.A-2 (CIRCUIT)		TP.A-2 (CIRCUIT)		TP.A-2 (CIRCUIT)		TP.A-2 (CIRCUIT)	
RECEIVER AND TAPE RELAY		RECEIVER AND TAPE RELAY		RECEIVER AND TAPE RELAY		RECEIVER AND TAPE RELAY		RECEIVER AND TAPE RELAY	
101610		101610		101610		101610		101610	
2 OF 2		2 OF 2		2 OF 2		2 OF 2		2 OF 2	



43 way single sided 0.1" gold plated D-Sub connector

NOTE : * ORIENTATION OF IC1 FIT EITHER J7 OR J8 DO NOT FIT BOTH		ENG.	FS D	11:39	GREENRANK ELECTRONICS
		DRAWN BY	K.S.P	27:2:80	TP-A2 (Assembly Drawing)
					DWG NO. 101620
					1 OF 1

PARTS LIST FOR SC/MP TAPE INTERFACE BOARD TYPE TPA-2 List Ref: TPA-2/P2

Add VAT to all Prices

May 1980

W Resistors.

22R	2	R16,19	.02	.04	
2k2	1	R17	.02	.02	
4k7	6	R 1, 14, 15, 18, 20, 24	.02	.12	
10k	1	R22	.02	.02	
22k	1	R7	.02	.02	
33k	8	R2,3,8,9,12,13,23,25	.02	.16	
100k	4	R4,6,21,26	.02	.08	.46










Preset Resistors.

2k2	1	VR2	.10	.10	
20k 20 turn	1	VR1	.94	.94	
47k	1	VR3	.10	.10	1.14

Electrolytic Capacitors.

47µF Tant 	1	C16	.25	.25	
100µF/16V 	2	C12,18	.10	.20	.45

Other Capacitors.

100p cer 	3	C1,5,14	.05	.15	
1n PS 	2	C4,8	.05	.10	
1n5 PS 	1	C9	.05	.05	
2n2 cer 	2	C13,17	.05	.10	
6n8 PS 	1	C7	.05	.05	
10n cer 	1	C15	.07	.07	
47n poly 	1	C19	.07	.07	
100n cer 	2	C3,6	.07	.14	
470n poly 	2	C10,11	.18	.36	1.09

Transistors.

BC177/178	1	TR1	.20	.20	
BFY 50/51/52	1	TR3	.22	.22	.42

Integrated Circuits.

555 (8 pin)	1	IC1	.29	.29	
3130E (8 ")	1	IC5	.04	.04	
4001 (14 ")	1	IC4	.17	.17	
4013 (14 ")	1	IC2	.42	.42	
4015 (16 ")	1	IC8	.39	.39	
4018 (16 ")	1	IC3	.89	.89	
4070 (14 ")	1	IC6	.23	.23	
4528 (16 ")	1	IC7	.99	.99	
4530 (16 ")	1	IC9	.85	.85	5.57 10.22

DIL IC Sockets.

8 pin	2	IC1,5	.10	.20	
14 pin	3	IC2,4,6	.12	.36	
16 pin	4	IC3,7,8,9	.13	.52	1.08

Terms VAT etc.

11.30


Add .35 handling charge per order and then 15% VAT

For various extras (terminal pins, 1" card front etc., see other price

GREENBANK ELECTRONICS

Telephone: 051-645 3391.

Options.

2R2	1	R5	.04	.04	
10k	2	R10,11	.02	.04	
47nF poly 	1	C2	.07	.07	
BC 107/108/109	1	TR2	.10	.10	
Relay e.g. 349-383	1	RLY1	2.26	2.26	

<u>Add VAT to all Prices</u>			October 1979	
<u>W Resistors.</u>				
10R	1	R15	.02	.02
22R	1	R16	.02	.02
1k	1	R1	.02	.02
2k2	1	R19	.02	.02
2k7	1	R18	.02	.02
3k3	2	R25,26	.02	.04
4k7	2	R8,17	.02	.04
10k	1	R21	.02	.02
22k	1	R5	.02	.02
27k	1	R2	.02	.02
33k	5	R3,6,7,9,10	.02	.10
47k	2	R20,23	.02	.04
100k	3	R4,11,22	.02	.06
220k	1	R24	.02	<u>.02</u> .46
<u>Preset Resistors.</u>				
2k2	1	VR2	.10	.10
20k 20 turn	1	VR1	.94	.94
47k Cermet	1	VR3	.45	<u>.45</u> 1.49
<u>Electrolytic Capacitors.</u>				
47uF Tant	1	C18	.25	.25
100uF/	2	C13,22	.10	<u>.20</u> .45
<u>Other Capacitors.</u>				
100p	2	C5,6	.05	.10
150p	1	C16	.05	.05
1n	2	C4,8	.05	.10
1n5	1	C9	.05	.05
2n2	2	C15,17	.05	.10
6n8	1	C7	.05	.05
10n	1	C14	.07	.07
47n	1	C23	.07	.07
100n	2	C2,3	.07	.14
470n	2	C10,11	.18	<u>.36</u> 1.09
<u>Transistors.</u>				
BC177/178	1	TR1	.20	.20
BFY 52	1	TR3	.22	<u>.22</u> .42
<u>Integrated Circuits.</u>				
555 (8 pin)	1	IC1	.29	.29
3130E (8 ")	1	IC5	.84	.84
4001 (14 ")	1	IC4	.17	.17
4013 (14 ")	1	IC2	.42	.42
4015 (16 ")	1	IC8	.39	.39
4018 (16 ")	1	IC3	.89	.89
4070 (14 ")	1	IC6	.23	.23
4528 (16 ")	1	IC7	.99	.99
4530 (16 ")	1	IC9	.85	<u>.85</u> <u>5.57</u> 9.48
<u>DIL IC Sockets.</u>				
8 pin	2	IC1,5	.10	.20
14 pin	3	IC2,4,6	.12	.36
16 pin	4	IC3,7,8,9	.13	<u>.52</u> <u>1.08</u> <u>10.56</u>
<u>Terms VAT etc.</u>				<u>10.56</u>

Add .30 handling charge per order and then 15% VAT

For various extras (terminal pins, 1" card front etc., see other price lists)

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